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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	:	Marie Angelopoulos, et al.
Serial Number	:	09/346,353
Filing Date	:	July 2, 1999
Examiner	:	T. Yoon
Group Art Unit	:	1714
For	:	METHODS OF FABRICATING PLASTICIZED, ANTIPLASTICIZED AND CRYSTALLINE CONDUCTING POLYMERS AND PRECURSORS THEREOF

The Honorable Board of Patent
Appeals and Interferences
Washington, D.C.

REQUEST FOR REMAND AND REHEARING

Three copies of this brief are submitted in support of Appellants' REQUEST FOR REMAND AND REHEARING of this Honorable Board's opinion (the *Decision on Appeal*, hereinafter "DOA"), which was rendered September 20, 2002, based upon Appellants' appeal of the Examiner's rejections of claims 1 - 16, 20, 22 - 25 and 40 - 42 in the above-identified application. Any fees which may be required incident to the filing of this Request should be charged to Deposit Account 50-0510. An extra copy of this authorization page is enclosed.

CERTIFICATE OF MAILING OR TRANSMISSION [37 CFR 1.8(A)]

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November 20, 2002
Date

Thomas A Beck
Signature

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REQUEST FOR REMAND

Since both new grounds for rejection and new reasons for rejection relating to the above-identified application have been introduced by the Board in the DOA, which Appellants have not had an opportunity to address, Appellants request remand of this application to the Examiner.

REQUEST FOR REHEARING

If this Honorable Board determines that the arguments presented herein warrant a reversal of some or all of the rejections that it issued in the DOA, in the alternative, Appellants, pursuant to 37 C.F.R. §1.197(b), request that the appeal on the instant application be reheard by this Honorable Board on the same record after considering the arguments presented in this submission.

Claim 1 on appeal provides:

--A method comprising:

forming an admixture of a solvent, an additive and a polymer selected from the group consisting of a precursor to an electrically conductive polymer and an electrically conductive polymer said polymer being soluble in said solvent said polymer not being substantially soluble in said additive in the absence of said solvent;

said additive provides local mobility to said polymer to allow said polymer to associate with one another to achieve a crystalline state; and

removing or partly removing said solvent substantially leaving said additive therein as remaining additive, said remaining additive provides local mobility to said polymer to achieve said crystalline state. - -

As stated by the Board at page 10 of the DOA, claim 1, in the underscored portion cited above, recites removal of all or less than all of the solvent; but it does not recite removal of the additive.

None of the references cited by the Board teach, suggest, provide the motivation for or the incentive for removing or partially removing solvent, while not removing an additive which provides the requisite local mobility, as recited by claim 1.

On page 15 of DOA, the Board erroneously states that Appellants do not disclose or exemplify any oxidants. Useful oxidants are well known in the art.

At page 15 of the specification under heading "Polyaniline Synthesis," Appellants teach: "Polyaniline is synthesized by the oxidative polymerization of aniline using *ammonium peroxydisulfate* in aqueous by hydrochloric acid." (Emphasis added) The ammonium peroxydisulfate is the oxidant. The last sentence of this same paragraph states: "Polyaniline can also be made by electrochemical oxidative polymerization as taught by W. Huang et al..." This disclosed method is directed to electrochemical *oxidative* polymerization. United States Patent 5,008,041 lists additional examples of oxidants and serves as a disclosure of oxidants available to the public at the time the invention was filed. This disclosure in the specification provides a teaching and an exemplification with respect to the presence of oxidants in the composition, that the skilled artisan would understand. A patent need not teach and preferably omits what is well known in the art. *Spectra-Physics, Inc. v. Coherent, Inc.*, 827 F2d 1524, 3 USPQ2d 1737 (Fed. Cir. 1987)

The Board has found no written description for Appellants' amended claim 24 which essentially recites the same admixture in the method as is recited in non-amended original claim 24.

One infers from the DOS that the Board appears to be of the view that the product of a polymerization synthesis does not contain any unreacted monomer or oxidant. Appellants disagree.

Appellants submit respectfully that the Board must concede that in any chemical reaction system, be it polymer or otherwise, the thermodynamics of the particular system determines whether a reaction will proceed. This system is analyzed in terms of the

relative enthalpies and entropies of the reactants and products in a chemical equilibrium. The mechanism of any chemical reaction must also be considered to help choose the proper conditions to employ to cause a thermodynamically favorable reaction to proceed to the desired products in good yield. Reaction mechanisms proposed for a reaction must account for changes in products and/or reaction rates caused by changes in the medium or temperature or by added catalysts. The kinetics of the reaction is also important. These factors, detailed above, are all relevant in the preparation of the admixture described in the instant invention. Simply stated, as a result of the reaction variables listed above, the statistical probability, in the real world of the laboratory or plant, of always obtaining a 100% conversion of monomer to polymer or of performing any treatment 100% effectively varies between slim and none. To contend that there is no unreacted monomer present in Appellants' reaction system both before and after the washing step can at best be characterized as unrealistic.

The washing, referred to at page 15 under the heading "Polyaniline Synthesis" removes the unreacted species, such as unreacted monomers and catalysts such as oxidants. (The oxidant is listed as a catalyst, which by definition is not used up in a reaction). How much of the unreacted monomer and the oxidant is removed depends on the effectiveness of the washing. Appellants' specification does not state that the washing must remove all of these constituents. Thus when the reaction solution is dried, the resulting composition can contain unreacted monomer and oxidant. Since Appellants' original claim 24 recites these elements, Appellants' original teaching recited in claim 24 (i.e. polyaniline monomer,...additive,...oxidant) is directed to that situation where the washing has not removed all of the unreacted monomer and oxidant. Accordingly, Appellants disagree with the Board's comment at the top of page 16 of the DOA that "There is no disclosure which indicates that the precursor / NMP solution contains any monomers or catalyst."

The Board at the top of page 16 of the DOS agrees:

> "...with the Examiner's implicit determination that the neutralized polymer recovered in the example would not have been expected to contain any unreacted monomer or oxidant catalyst remaining in the polymer after the treatment steps set forth in the example had been performed."

As stated previously, whether or not there is unreacted monomer or catalyst present in the dried polymerized polymer powder depends on the effectiveness of the washing, again a function of the various thermodynamic and kinetic factors detailed above. Original claim 24 claims that the admixture contains a polyaniline monomer, the aforementioned additive and an oxidant. Claim 24, as presently written, claims an admixture resulting from a less than perfect washing step. The residuum so obtained "further includes monomer of said precursor and an oxidant."

In the Board's comments under "The Alternative Rejections Under Sections 102 and 103," starting at page 16 of the DOA, the Board states:

> "Appellants' method as set forth in claim 1 only requires the admixing of 'a solvent', 'an additive' and 'a polymer.' In Example 6, Han 'admixes' N-methyl pyrrolidinone, one of appellants' preferred 'solvents', tripropylamine, a 'plasticizer' ('additive') and an electrically conductive polyaniline, 'a polymer.' Han also teaches partial or substantial removal of the 'solvent.' Cao teaches the admixing of a polyaniline polymer with xylene, 'a solvent' and dodecylbenzene sulfonic acid, one of appellants' 'plasticizers'. Cao teaches removal of the solvent by conventional solvent removal methods."

In the passage quoted above, the Board refers to "N-methyl pyrrolidinone" as one of Appellants' preferred solvents and to tripropylamine as a "plasticizer". In this statement the Board is mixing the terminology used by Han, with the terminology used by Appellants. Han discloses only "plasticizers." Han refers to "tripropylamine" at col. 6, line 64 as "Illustrative of useful plasticizing agents" see col. 6, line 46, and further refers to"N-methyl pyrrolidinone at col. 7, line 64 as one of the "preferred plasticizing agents." (See col. 7, line 47). Although Appellants refer to "N-methyl pyrrolidinone" as an example of a solvent, Appellants' specification makes no mention of "tripropylamine." From the perspective of accuracy, the Board's statement above should say that Han's example 6 teaches, (using Han's terminology), a preferred plasticizer,

e.g., N-methyl pyrrolidinone, and a plasticizer (of lesser preference), as illustrated by the compound "tripropylamine."

Han does not teach, as is claimed by Appellants, "a solvent" and an "additive to provide local mobility to said polymer to allow said polymer to associate with one another to achieve a crystalline-state" as claimed in claim 1.

Han has no teaching that N-methyl pyrrolidinone acts functionally different from tripropylamine. Whereas Appellants' claim 1 defines a significant unexpected distinction between the solvent and the additive.

At the top of page 17 of the DOA the Board states that:

"Because appellants form an admixture from the same ingredients as used in the prior art and because appellants subject their admixture to the same processing steps, that is, admixing of the ingredients with subsequent removal of "solvent" as does the prior art, it is reasonable to conclude that appellants' method and the products obtained by appellants' method are the same... Citing In re Best, 562 F.2d 1252, 195 USPQ 430 (CCPA 1977). "

The Board states that it is

"reasonable to presume prior art products and claimed products are identical or substantially identical where they are produced by the same or substantially the same processes."

Appellants respectfully disagree. As stated above, Appellants do not "form an admixture from the same ingredients as those used in the prior art" and thus Appellants' process is not substantially the same as the prior art.

On page 18 of the DOA the Board citing, *In re Best*, 195 USPQ 430, states:

"Where, as here, the claimed and prior art products are identical or substantially identical, or are produced by identical or substantially identical processes, the PTO can require an applicant to prove that the prior art products do not necessarily or inherently possess the characteristics of his claimed product .... Whether the rejection is based on 'inherency' under 35 USC 102, or 'prima facie' obviousness' under 35 USC 103, jointly or alternatively, the burden of proof is the same, and its fairness is evidenced by the PTO's inability to manufacture products or to obtain and compare prior art products." [footnotes and citations omitted]

As stated above, there is no teaching, suggestion for or motivation for Appellants' invention and thus there is no showing of *prima facie* obviousness. There is no rejection in the record based upon inherency and inherency can not support an obviousness rejection, since what is inherent in a reference is not taught by the reference.

The Board further states at page 18 of the DOA:

"There is simply no evidence in this record which establishes that the electrically conductive polymers obtained by appellants' method is, in fact, different from what is obtained by prior art methods of admixing electrically conductive polymers with a 'solvent' and an 'additive'."

Appellants respectfully disagree. Appellants' polymers are different, since, as stated above, the art cited by the Examiner provides no teaching, suggestion, motivation for or incentive for Appellants' claimed invention. This Honorable Board is respectfully directed to the arguments presented hereinafter relating to Claim 41 for further support that Appellants' system is different from the prior art.

NEW GROUNDS FOR REJECTION

Pursuant to this Honorable Board's authority under 37 C.F.R. § 1.196(b), Claims 40-42 have been rejected in the DOA under 35 U.S.C.§ 102 or 35 U.S.C. §103 as being unpatentable over Cao, et al., Han and Ikkala.

Claim 1 recites *inter alia*: "forming an admixture of a solvent, an additive and a polymer"and that the "additive provides local mobility to send polymer to allow said polymer to associate with one another to achieve a crystalline state."

Claim 40 recites that the "additive is an oxidant," that is, claim 40 states that the additive serves a dual purpose; it provides local mobility and is at the same time an oxidant. The use of oxidants in polymerization reactions is well known and is particularly well known in the synthesis of electronically conductive polymers. Chemical constituents in chemical reactions can have more than one property. At page 15 of the specification, in the first paragraph under the heading "Specific Examples" teaches, as noted above, that "Polyaniline is synthesized by the oxidative polymerization of aniline using ammonium peroxydisulfate in aqueous hydrochloric and ... Polyaniline can also be made by electrochemical oxidative polymerization as taught by W. Huang ... J. Chem. Soc. Faraday Trans. 1, 82, 2385, 1986." The references to Cao, Han and Ikkala teach oxidants *per se*, but have no teaching, suggestion, motivation for or incentive for additives that provide local mobility.

In the course of the prosecution, in citing the Cao, et al. and Han references, the Examiner, *sua sponte* projected the teachings disclosed by Appellants in their application into the references and used that unwarranted projection as the basis for his rejection. Because the Examiner used Appellants' teaching to add to Han and Cao, et al., and because there was no antecedent basis for doing so, Appellants requested that the Examiner: (a) produce references to support the Examiner's statements supporting his asserting in the rejection; (b) supply an affidavit as provided for under 37 C.F.R. § 104(d)(2) for the Examiner to qualify himself as an expert to make the assertions that he did, or (c) withdraw the rejections. None of the suggested courses was forthcoming. Appellants continue to maintain that the Examiner has no proper basis for his rejection and extends that same objection to the rejection of the claims by this Honorable Board.

The Board states at the top of page 20 of the DOS:

> Whether named "plasticizers" or "oxidants" or diluents" or even simply a "second material", the fact remains that the appellants admix the same compounds as the prior art "admixes" and it is, therefore, reasonable to presume that appellants obtain the same materials as the prior art obtains.

Appellants respectfully disagree and submit that there is a critical flaw in the Honorable Board's assertion. Appellants emphasize that, as supported by the arguments presented

above, Appellants do not admix the same compounds as the prior art admixes. Thus the same result will not obtain.

These same arguments apply to the Board's reasons for rejection of claims 41 and 42 in the first full paragraph on page 20 of the DOA.

Claim 41 which is dependent upon claim 7 covers:

> "A method comprising:
> forming a combination of a first material, a second material and a solvent:
> said first material is selected from the group consisting of a precursors [sic] to an electrically conductive polymer and an electrically conductive polymer;
> said second material being soluble in said solvent, said second material not being substantially soluble in said first material in the absence of said solvent."

wherein the second material is an oxidant.

Elsenbaumer as a reference does not anticipate nor render obvious the present invention. Appellants' emphasize as has been stated, that their invention is a method of forming an admixture of solvent, an additive and a polymer which is either a precursor to an electrically conductive polymer or an electrically conductive polymer wherein the solvent is removed or partially removed and the additive provides local mobility to the polymer to allow the polymer chains to associate tightly with one another to achieve a high crystalline state.

Elsenbaumer discloses a method of using a solution to form a conducting polymer. He discloses polyaniline in combination with an oxidizing dopant. He illustrates the useful dopants by disclosing a list of compounds, a substantial number of which are halogen-containing compounds. His preferred dopants are chlorine and bromine-containing compounds with the most preferred dopant being $FeCl_3$.

Elsenbaumer uses his dopant to modify the electrical properties of the polymer. Appellants have emphasized in the specification (page 11) that the morphology of a polymer is very important in determining the polymer's physical, mechanical and electronic properties. Appellants specifically state that prior art polyaniline base films

of the type disclosed by Elsenbaumer are amorphous and are depicted in figure 5(a) of the drawings. Appellants submit that their invention is an improvement over the typical Elsenbaumer doped polymer. Appellants have obtained an unexpected benefit as a result of their discovery that the additive provides local mobility to the polymer to allow the polymer chains to associate tightly with one another to achieve a high crystalline state. Appellants have distinguished over the Elsenbaumer reference by virtue of the experimental data disclosed in the specification on page 12 as supported by Figure 5(a) of the drawings.

Appellants state at page 12 of the specification:

> Doping the amorphous polyaniline base films (those having structure shown in Figure 5a) with aqueous hydrochloric acid results in isotropic conductivity of 1S/cm. Such films are not crystalline. ...It should be noted that some level of crystallinity is lost during the doping process in these films." (Emphasis added)

Thus, Appellants have provided experimental data (under oath) that clearly establishes and supports the necessary difference in kind rather than degree of the oxidant that they use as opposed to the dopant of Elsenbaumer under similar conditions. The preferred $FeCl_3$. species in solution of Elsenbaumer provides the Cl^- ions analogous to the HCl used by Appellants in their comparative evaluation. The enhanced crystallinity (one of the objects of the invention) enhances the electrical properties and renders the Appellants' invention an unexpected improvement. Accordingly Claim 41 is patentable over Elsenbaumer.

Claim 42 which is dependent upon Claim 12 covers

> A method comprising:
> providing solution of polymers in a solvent;
> said polymers are selected from the group consisting of precursors to electrica1ly conductive polymers and electrically conductive polymers;
> providing mobility to said po1ymers to al1ow said polymers to associate with one another to achieve a crystal1ine state by adding a plasticizer to said solvent;
> said plasticizer being soluble in said solvent. said p1asticizer not being substantial1y solub1e in said polymer in the absence of said so1vent.

wherein the plasticizer is an oxidant.

The arguments submitted hereinabove relating to the patentability of Claim 41 are hereby incorporated by reference with respect to Claim 42. The data found in the specification supports Appellants assertion that the plasticizer-oxidant provides a result that is different in kind rather than degree.

At page 21 of the DOA the Board rejects claims 1, 2, 6-9, 15, 16, 20, 22, 40 and 41 under 35 U.S.C. §102 and §103 as anticipated by or unpatentable over Elsenbaumer. In the paragraph bridging pages 20-21, the Board cites passages from Elsenbaumer. The Board is interpreting the teaching of oxidant in Elsenbaumer to be the additive recited in Appellants' claims. Appellants' additive "provides local mobility to said polymer to allow said polymer to associate with one another to achieve a conductive state."

Elsenbaumer provides no teaching, suggestion, motivation for or incentive for this directly or inherently and this rejection should be withdrawn.

Respectfully submitted,

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